University of California
Lawrence Livermore National Laboratory

Nonproliferation, Arms Control, and International Security Directorate

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The Forensic Science Center, with its capabilities for characterizing virtually any sample, contributes to U.S. efforts in nonproliferation, counterterrorism, and law enforcement

Mission

The Forensic Science Center provides, in a single location, the instrumentation and expertise required to perform a broad spectrum of chemical, nuclear, and biological analyses and rapidly characterize samples important to national and global security.

Analytical Capabilities

We have collected, under one roof, expertise in analytical chemistry, organic chemistry, inorganic chemistry, nuclear chemistry, toxicology, pharmacology, and metallurgy. Techniques available include:

- Computer-guided gas chromatography–mass spectroscopy.
- High-performance liquid chromatography and capillary electrophoresis.
- Laser-ablation mass spectrometry.
- X-ray fluorescence and gamma-ray spectroscopy.
- Scanning electron microscopy.
- Videotape enhancement.

The Forensic Science Center works in partnership with Livermore's Isotope Sciences Division to extend its capabilities and expertise for radiological analysis. We also conduct R&D to develop new instruments and optimize existing techniques for use in field operations.

Accomplishments

- Development and demonstration of a miniaturized gas chromatography-mass spectroscopy instrument for field analysis, optimized for detection and identification of ultratrace quantities of high explosives, narcotics, and chemical-warfare components, precursors, and decomposition products. The instrument is portable, weighs about 60 pounds, and is comparable in sensitivity and selectivity to laboratory-scale instruments.

- Development of portable field-sampling kits for on-site cample collection. The kits are custom-tailored for the activities of interest in a given investigation.

Accomplishments continued on reverse side

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• Coordination of forensic analyses across the DOE laboratory network for the first-ever counter-nuclear smuggling exercise. Various analyses provided information on the origin of the nuclear material as well as other information of value to law enforcement.

• Participation in international Round Robin experiments to support the Chemical Weapons Convention and build an understanding of the operational parameters necessary for detecting key signatures of chemical weapons proliferation.

• Analysis of debris from the explosion of an electrochemical "cold fusion" cell, including the unanticipated detection of machine-shop lubricating oil as a potential contributor to the incident.

• General forensic analyses of specimens from around the world, including illicit nuclear materials, counterfeit U.S. $100 "Supernote" bills, and materials related to the UNABOM investigation.

• Development of a feasible chemical possibility to explain a toxic incident involving "mystery fumes" from a dying patient at a Southern California hospital.

Benefits to the Nation

The development of weapons of mass destruction—whether nuclear, chemical, or biological—generates a variety of unique chemical species and materials. Chemical, biological, and radiological analyses of effluents in air, water, soil, and vegetation can help identify sites and operations associated with weapons production and can fingerprint specific proliferation activities. By applying a broad forensic approach at a single, centralized facility, the Forensic Science Center can rapidly characterize samples important to national and global security. With analytical capabilities for virtually any compound in any sample matrix, our integrated approach to forensic analysis maximizes the information obtained from samples collected by various verification, inspection, monitoring, and law enforcement agencies.

Contact

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